Materials Libraries

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Published in:
Journal of Jewellery Research

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Vones, K. (2018). Materials Libraries: A Jeweller's Perspective. *Journal of Jewellery Research*, *1*, 34-50.

MATERIALS LIBRARIES - A JEWELLER'S PERSPECTIVE

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JJR journal of jewellery research

Figure 1. The Interior with display shelves and cabinets at the Institute of Making, UCL, London Photo credit: Katherina Vones

INTRODUCTION

A growing interest in the rich critical discourse surrounding the diversity of contemporary materiality has uncovered the need to develop common modes of interaction between cross-disciplinary researchers that include creative practitioners, material scientists, and social anthropologists. This involves examining how novel materials can be used innovatively and meaningfully in a design context (Vones, 2017) as well as issues of material selection according to psychosocial meanings and sensorial properties (Karana et al., 2009; Karana et al., 2010; Piqueras-Fiszman et al., 2012; Wilkes et al., 2016). Doordan's (2003) notion of a framework that uses materials as a "lens to focus insights derived from different disciplinary perspectives and methodologies" was subsequently amended by Karana et al. (2015) to include the concept of an "experiential materiality" within a user-centred discourse. These are highly useful analytical tools in the context of academic research, but creative practitioners wishing to engage more closely with the aesthetic, functional and emotional aspects of contemporary materiality are in need of a more tangible resource. As Karana et al. (2015) point out

> *"In the material infrastructure of today's world, whether in products, buildings or other creations, we see such variety of materials, driven largely by advances in technology. The layperson's knowledge of these materials, in the sense that they are recognizable and identifiable, is probably at an all-time low. Similarly, new and emerging materials, along with the increasing demand to seriously adopt a discourse of sustainability, conspire to continually challenge the designer's competence in materials selection." (Karana et al., 16: 2015)*

Figure 2. An array of samples of different types of metals in various forms at the Institute of Making. Photo credit: Katharina Vones

Over the last decade, a variety of materials libraries have been established globally to meet the need highlighted by Karana, conceived as publically accessible open-access venues, research institutes or commercial ventures. While contemporary jewellery as a discipline is particularly invested in dissecting the sensitive historical narrative surrounding a traditional versus a contemporary materiality (Cohn, 2012), which examines issues of perceived preciousness and value (Skinner, 2013), very few practitioners of the discipline are actively aware of the existence of materials libraries. A large proportion of their users originate from the fields of product design, architecture and its allied construction industries as well as engineering.

This paper was designed to introduce the concept of Materials Libraries to a wider audience of contemporary jewellery practitioners and researchers. It is a snapshot of qualitative research on Materials Libraries undertaken over

Figure 3. Sulphuric Acid-Sugar Growths made during a public engagement workshop at the Institute of Making
Photo credit: Katharina Vones

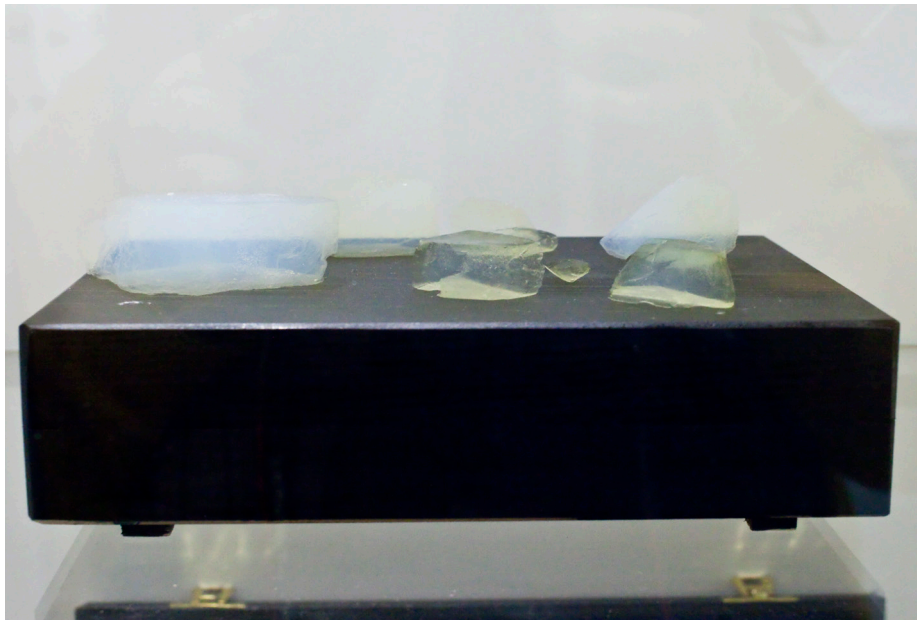

Figure 4. Rare 'lump' samples of Aerogel kept at the Institute of Making. Developed by NASA as the lightest solid available, the yellow discolouration is a result of repeated handling by visitors.
Photo credit: Katharina Vones

a period of four years between 2012 and 2016, consisting of extensive site visits to a number of locations. For the purpose of this paper, I have selected images from those materials libraries situated in London to provide an overview of the diverse spaces and types of materials that are available to contemporary jewellery practitioners within one geographical location.

TOWARDS A NOVEL MATERIALITY

Since the first institutional materials library in the UK opened at the Royal College of Art in 1974 (Wilkes, 2011), the increasing desire by designers, visual artists, researchers and materials enthusiasts to explore a wide range of both commercially available and highly experimental materials in an open, collaborative environment has given rise to significant growth in the number of materials libraries operating globally over the last decade. Within the UK alone, nine materials libraries are currently operating, each with a different focus and access parameters, ranging from those based at academic institutions, to fee-paying commercial consultancy ventures. While some libraries select materials by focusing on a particular discipline, such as architecture, interior design or the construction industries, others specialise in rare, laboratory-grade materials. Most commercial materials libraries also have extensive searchable online databases, whilst others exist only online or as pop-up venues and have no physical site to examine materials first hand.

However, while the agenda of sharing knowledge and creating connections between materials scientists, the materials industry, and the creative community is a worthwhile agenda that should be encouraged, particularly at a time when collaborations between the arts and sciences

Figure 5. Scin Gallery London, 2014
Photo credit: Katharina Vones

are essential for the development of new cross-disciplinary approaches, there are still significant barriers in place when it comes to creating such exchanges. Advocates of materials libraries, such as Mark Miodownik of the Institute of Making in London, praise the ability to encourage scientists to think about the sensoaesthetic properties of materials rather than their functionality by consulting creative practitioners and researchers, whose main focus arguably lies in identifying how users connect with materials on a more intuitive level:

> *"Characteristics such as smell and feel are almost impossible to capture in simple numbers, [Miodownik] noted, and many modern products show evidence of the fact that these properties were ignored during their design. The only way that people can gain an understanding of these other material properties, suggested Miodownik, was by experiencing the materials directly – touching them, manipulating and interacting with them in different ways." (Ward, 2008)*

Miodownik's appeal applies to material scientists and creative practitioners and researchers alike – with one group needing to explore ways of designing materials that contain optimum functionality while also taking into account sensoaesthetic properties, and the other engaging with how such materials could be used sensitively in designing an object with maximum functionality whose tactile and aesthetic qualities capture the imagination of the end user. However, the constraints currently faced by materials libraries in building a culture of interdisciplinary knowledge exchange are still significant. While the idea of the materials library as a collection of unusual materials to be made

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available to creative practitioners, researchers, and scientists alike may have existed for decades, the serious progression of a strategic agenda in terms of building such collections and making them available to a larger audience is a development that has gained momentum only fairly recently. Even those materials libraries that have been established over the last ten years, both in academic institutions and as commercial ventures, are limited in the scope of their expertise. As Miodownik points out:

> *"[...] they serve very specific design communities, their materials collections are extremely limited, they only deal with commercial materials, but most importantly, they are almost completely dissociated from the materials-science community." (Miodownik, 2009)*

Additionally, the ties between industrial suppliers of materials and materials libraries are tentative at best, with many suppliers reluctant to provide experimental materials in quantities small or large enough to be useful to creative practitioners in their research and development, or indeed at all. In her conversations with material librarians, Sarah Wilkes extrapolates that:

> *"[...] in the eyes of many involved in materials education, concerns over corporate secrecy and ownership on the part of materials producers are a hindrance to both creativity and technological progress." (Wilkes, 2011)*

The questions of intellectual property and pending patent applications loom large during such exchanges between supplier and creative practitioner, and frequently a satisfactory conclusion cannot be reached. While some of the most interesting materials represented in materials libraries

Figure 6,7. A selection of material samples submitted to the SCIN Gallery Materials Library by artists and designers from all over the world. Photo credit: Katharina Vones

Figure 8,9. A selection of material samples submitted to the SCIN Gallery Materials Library by artists and designers from all over the world.
Photo credit: Katharina Vones

are often in a pre-commercial stage of development, suppliers are worried about providing such materials to creative practitioners and researchers before potential revenue-generating avenues have been exploited. This quickly turns into a catch twenty-two situation, with many materials never reaching financial viability at all due to their lack of practical applications and thus commercial demand. Often such demand might have been created if creative practitioners and researchers had been encouraged to experiment with these materials and had thus discovered novel and previously unanticipated ways of using them. To recognise the potential of such mutually beneficial relationships, a liaison between industrial suppliers, creative practitioners and researchers, experienced in dealing with the concerns of either party would be necessary – something a lot of materials libraries are struggling to provide as of yet.

ENCOURAGING EXPERIENTIAL MATERIALITY

As an essential part of my research into the field of smart materials, I conducted an extensive range of site visits to various European materials libraries over a four-year period, from 2012 to 2016. While initially my aim was to use the holdings of these libraries to find samples of innovative smart materials, I quickly realised that this would most likely not be the case, as most of the materials libraries currently operating focus on exhibiting samples of materials that are already commercially available. Because of this, some materials libraries that are sponsored either directly by material manufacturers, such as the Material Lab in London (Johnson Tiles, 2011), or indirectly through sample donations or the selling of prime exhibition space, such as the Materia Inspiration Centre in Amsterdam (Vones, 2014), present a more biased offering than those not linked to industry. This does not necessarily diminish their value to an individual

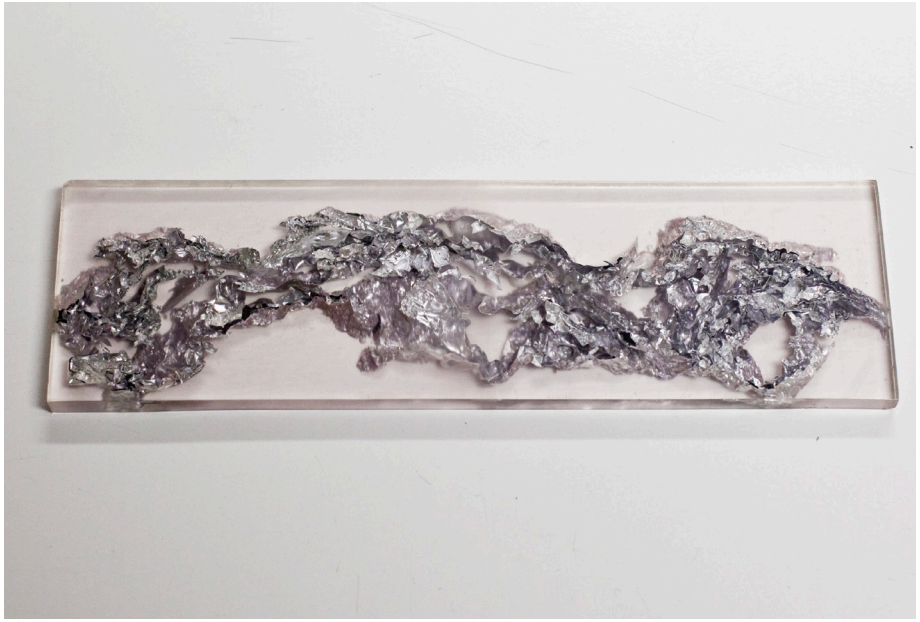

Figure 10. An artist's sample of aluminium foil embedded within clear resin
Photo credit: Katharina Vones

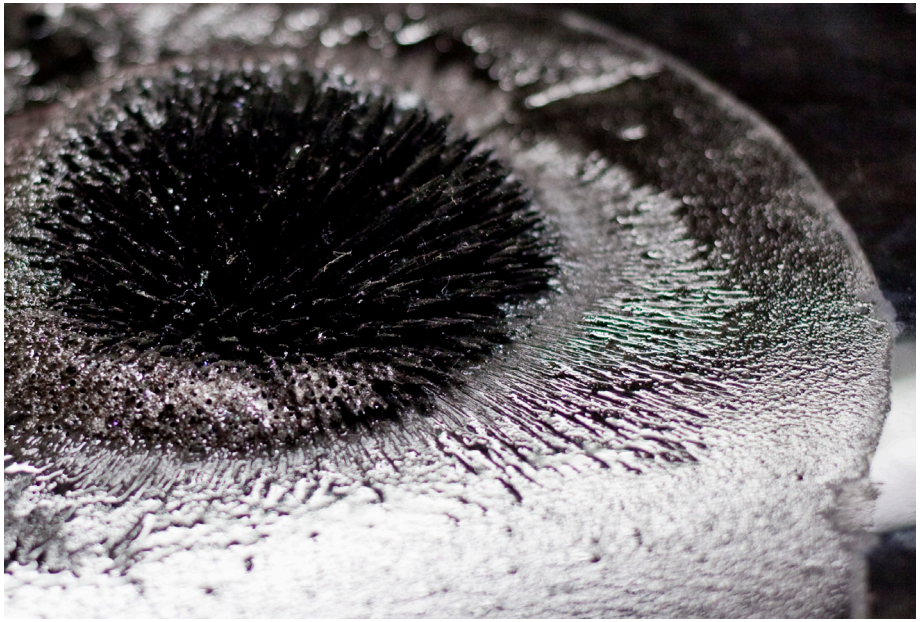

Figure 11. An artist's sample of Ferroresin submitted to the SCIN Gallery Materials Library.
Photo credit: Katharina Vones

creative practitioner searching for a novel material to enhance their practice – indeed, this could be of benefit, as the frustrating leg-work of finding supplier information has already been done, and the certainty exists that the material is commercially available. Unfortunately most smart materials, bar a few exceptions, are not as yet widely commercially available, and thus are represented sparingly in such materials libraries.

One of the greatest challenges I encountered when arranging my site visits was that of access. Some manufacturer-sponsored and open-access libraries such as Material Lab and the SCIN Gallery in London are freely accessible during weekday business hours on a walk-in basis and do not require an appointment. This is the ideal scenario for creative practitioners and researchers, who can visit in accordance with their own project schedules, and need not incur any further financial outlay. As can be seen in the case of the Materia Inspiration Centre, the sponsorship model is highly dependent on sustaining support from materials manufacturers as well as commercial and industrial clients, who in turn, follow the dictats of wider economic circumstances. For instance, a recent downturn in the construction industry and its associated branches has meant that demand for the services of Materia and thus its financial support waned (Materia, 2013), and therefore the decision was taken to close the physical site in Amsterdam. Materia's collections are still available for viewing through travelling exhibitions at trade shows, and the online database remains fully operational, but for the individual creative practitioner or researcher seeking tactile access to materials this is still a grave loss.

However, the sponsorship model is a rare arrangement, and currently most materials libraries are either located within an academic institution or operate a subscription-based

financial model. Each type comes with its own particular drawbacks and challenges. Materials libraries based within academic institutions are often organised on a departmental leve and overseen by a small team of researchers, who may be unavailable during busy teaching periods or throughout scheduled university vacation times. While these libraries often successfully serve their own student community, it can be tricky to arrange an appointment as a visiting creative practitioner or researcher. Indeed, during these times of increasing financial pressures levied on universities, there may be a vested interest for institutions in keeping their facilities exclusively for the use of their staff and student populations as a selling point to attract fee-paying students. Some academic materials libraries, such as the Institute of Making, seek solutions for individual creative practitioners and researchers to have improved access to their collections by arranging public engagement events such as open-days and occasional focused 'materials festivals'. These are very recent developments and the masterclasses and MakerSpace facilities offered by the Institute of Making are currently only open to staff, students and researchers based at the hosting institution.

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In contrast, the subscription-based model is applied by the majority of materials libraries I encountered. The relatively expensive annual subscription packages offered by these materials libraries, often only affordable to commercial clients and governmental bodies, are financially overwhelming for individual creative practitioners and researchers and as a result only very few have access to these resources. Some libraries offer discounts in the form of special student and small business memberships, online database access-only packages and even daily and hourly

Figure 12. Material Samples found at the SCIN Gallery Materials Library.
textile and concrete tile
Photo credit: Katharina Vones

Figure 13. Material Samples found at the SCIN Gallery Materials Library.
paper made from snail excrements
Photo credit: Katharina Vones

Figure 14. Material Samples found at the SCIN Gallery Materials Library.
self-healing concrete
Photo credit: Katharina Vones

access rates, but these are still pricey, and of limited use to creative practitioners and researchers. This model poses a serious barrier of entry for most, and I was often only able to gain access to their facilities by explaining my research project in depth and mostly focusing on documenting the facility itself rather than delving into a more extensive materials search through their archives.

Many of the subscription-based libraries pride themselves on offering a bespoke consultation service, with each library visit accompanied by an individually assigned consultant. In an interview I conducted during my visit to the Materiautheque at the Innovatheque FCBA in Paris, with materials consultant Brice Tual, I discovered that one of the main motivations for using this model is to enable a more critical and independent criteria-based selection system for the inclusion of new materials (Vones, 2014). Tual states that the Materiautheque selection committee, consisting of up to six members from a variety of backgrounds, meets four times a year to whittle a pre-selection of over 2000 materials down to a maximum of 250 for inclusion in the library per year. Selection criteria are stringent and immediately exclude any materials without safety data and technical information, effectively shutting the door on materials that are still at a lab-stage of development. While this is entirely understandable for a commercial venture aimed mainly at sectors such as product design, fashion design, architecture, furniture design and ecological design who use these libraries as a time-saving shortcut in their product development cycle, the scope of the materials on offer is immediately curtailed. Furthermore, the library's role as mediator between creative practitioner and supplier ends after the first introductory phone call – all negotiations that follow are to be conducted entirely by the clients themselves.

There is also no established and standardised system

Figure 15. Materials are kept in labelled boxes at the SCIN Gallery Materials library. Photo credit: Katharina Vones

of classification for the materials kept in materials libraries, and with each library having devised its own way of displaying, storing and cataloguing their collections it is virtually impossible to tell whether any particular library might be of use to the individual creative practitioner and researcher without extended visits to the physical sites or online databases. The increasingly rapid development of new materials often renders holdings obsolete and the issue of shelf space means that legacy materials are frequently discarded or consigned to inaccessible storage indefinitely. Some libraries allow visitors to take away a limited number of free samples from their legacy and duplicate stores to experiment with, which is a helpful way to gain access to some materials, but this process can be very hit-or-miss. It seems that for the adventurous creative practitioner or researcher without an academic or commercial connection it would be more beneficial to engage in the initial research process themselves by visiting materials expositions, conducting internet research and contacting suppliers directly for samples of interest to their particular field. In my own creative practice as a contemporary jewellery artist and researcher, who focuses on the practical application of smart materials, I have found materials libraries to be of limited value. While some of the materials I used in my practice, such as colour-changing photochromic, thermochromic and nano pigments (Figs. 16 & 17), were on display in some of the materials libraries I visited, multiple attempts to contact manufacturers directly to request samples often yielded few tangible results. In most cases, a personal introduction by another creative practitioner or researcher already familiar with the company was required to stimulate a meaningful interaction.

While the emphasis of the materials libraries I visited was mainly on providing information on the commercial availability and physical characteristics of any given material on display, very little information was generally provided

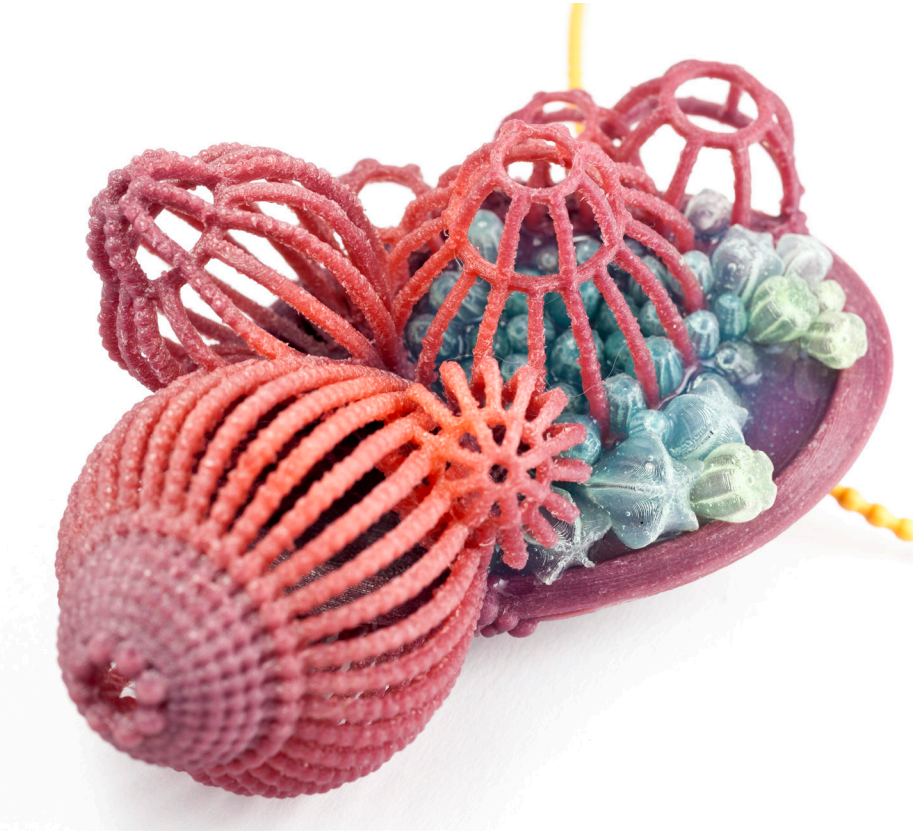

Figure 16. Necklace from the Radiolaria series, 2017. Materials: Thermochromic PLA, Photochromic Silicone, Steel Chain, Plastic Coating.
Photo credit: Katherina Vones

on how to work with them. Clearly aimed at a specialist audience, an in-depth knowledge of advanced manufacturing and material-specific processes was often assumed on the part of the visitor. While more familiar materials such as plastics, wood, stone and composites could easily be explored in the workshop through the lens of the contemporary jeweller's practical skillset, this is not the case for more experimental materials. Working with smart materials, for instance, requires detailed process knowledge that is highly specific and experiential in quality, and has often not been formalised through practice-led research. A case in point can be found in the increasing interest by the jewellery community in shape-memory metals. Practitioners such as Sompit Moi Fusakul (Fusakul, 2002) and Leah Heiss (Heiss, 2009), have contributed to the very small amount of practical instruction that is currently available on how to work with this challenging material that cannot be joined or shaped by utilising traditional metalworking techniques. However, most of the other research on offer relating to this material is from STEM-related disciplines such as physics, engineering and materials science and is mainly concerned with its physical characteristics in a laboratory context. If materials libraries were incentivised to close this gap by providing practical process knowledge for each material on display, this would enable creative practitioners and researchers to participate in a deeper engagement with novel materiality, which would open a pathway for innovation that could encourage product development, commerci¬alisation and novel material uses.

CONCLUSION:

On the Value of Materials Libraries

As my research has spanned a period of over four years, some parts of it have inadvertently taken on the characteristics of a historical account. Observing the phenomenon of the materials library over a prolonged period of time has highlighted both its strengths and its weaknesses. For instance, most of the libraries based on the open-access model have now been forced to close down their sprawling physical locations, mostly due to financial shortfalls (see Table A). Two of these libraries (including the SCIN Gallery) have converted their operations to a pop-up exhibition-based

Figure 17. Pendant from the Radiolaria series, 2017.
Materials: SLA Acrylic (dyed), Photochromic Silicone, Chameleon Nano Pigment, Sterling Silver Chain.
Photo credit: Katharina Vones

Figure 18. Material lab, 2015
Photo credit: Katharina Vones

"roadshow model". While this is a much more economically efficient model, it also comes with several significant restrictions. For one, creative practitioners and researchers who are interested in viewing particular materials might find it difficult to do so, as the material selection taken to each pop-up exhibition is tailored to the particular event it is hosted by. As such events are often trade fairs related to a particular industry, this severely limits the scope for serendipitous discovery offered by the ability to browse the material collection in its entirety. Furthermore, trade fairs are largely attended by a specialist audience, and often restrict members of the general public from entering freely. While some creative practitioners and researchers might be well-connected or determined enough to circumvent such barriers to entry, for the average creative practitioner it might prove to be an insurmountable hurdle.

The only two materials libraries I visited that remain completely committed to the open-access model are the Material Considerations Materials Library in Glasgow and the Material Lab in London. This is primarily achieved through full corporate sponsorship, which creates an operational model with a different, but no less significant, set of challenges to the roadshow model. Corporate sponsorship can lead to a bias in material selection towards the industry in which the sponsor is operating, leaving little room for showcasing materials in an unbiased, commercially detached fashion and curtailing the breadth of the collection on offer.

While the sponsorship model is a perfectly valid and still very valuable approach, it is not suited for disseminating knowledge of more experimental and unusual materials. For this, the institutional model would appear to be the most suitable, such as in the case of the Institute of Making. Gathering researchers from a varied range of disciplines as well as core staff members who are practitioners in the fields

Figure 19. A display of tile and wallpaper samples at Material Lab, London
Photo credit: Katharina Vones

Figure 20. A display of surface finish samples at the Material Lab, London.
Photo credit: Katharina Vones

of art, design, engineering and material science in one place might seem like an ideal incubator for significant material exploration. However, the closed-access policy imposed by the host institution, means that this resource can only ever benefit a very small pool of select initiates. The ideal situation would be to establish a network of such materials libraries at numerous educational institutions throughout the UK, sharing knowledge and skills with each other and with the wider education, creative and maker communities on an open-access basis. However this will in all likelihood remain a theoretical scenario, as currently the merely nascent interest of the creative community and educational institutions to foster an innovative material culture translates into a dearth of available funding.

Finally, materials libraries utilising the subscription-based model appear to thrive. With new branches opening every year, there seems to be an appetite for the professional services and exclusive spaces provided by those branded experiences. The locations of newly established libraries (for example: Shanghai, Daegu, Bangkok) point to a drive, particularly in Asia, to expand expertise in this area and for educational institutions to be seen to take out memberships as an outward indicator of prestige. This is a trend already observed in North America, where universities often justify their considerable tuition fees by providing students with the most expensive resources. Some commercially-run materials libraries have monetised this trend further by operating a franchise model, which enables individual universities, governmental bodies and companies to establish their own, scaled-back versions of the brand's main materials libraries with relative ease. For example, the Material Connexion brand has so far established seven 'satellite libraries', and fourteen 'educational libraries', most of which are concentrated in North America, Asia and the Middle East.

While the general drive towards a more inquisitive material culture in education, corporate, and public life is to be applauded, the subscription-based model is by definition exclusive, and does not aid creative practitioners and researchers who operate outside of these contexts.

It is these latter groups, who, without institutional or corporate access to materials libraries and little direct contact with materials scientists, developers and suppliers, depend on open-access materials libraries to remain operational. The development of personal, customised materials libraries through creating unique material samples that combine readily available materials, as evidenced by some samples kept in the SCIN Gallery, could offer an alternative for those not able to access a materials library. The creation of sets of isomorphic prototypes, as recently suggested by Wilkes et al. (2016), for individuals and collaborative research groups in order to establish a common language for experiential material properties, is another promising possibility. For the average contemporary jewellery practitioner, without academic or commercial affiliations, materials libraries thus remain a fascinating proposition of limited practical value.

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JJR journal of jewellery research

Journal of Jewellery Research
http://www.journalofjewelleryresearch.org

ISSN 2516-337X

Loughborough University,
Northumbria University &
University of Dundee.
First published in February 2018, UK.

Journal of Jewellery Research is a double blind peer-reviewed research journal supported by an International Editorial Advisory Group.